BIOSOLIDS RESUSPENSION IN AQUACULTURE TANK IS AFFECTED BY DISAGGREGATION AND CONSOLIDATION TIME

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Sedimentation dynamics of biosolids in an aquaculture tank determines the accumulation at the bottom of the tank, which affects oxygen availability, and in turn fish welfare and growth. Settled particles are susceptible to be resuspended. Independently of the average water velocity, turbulence produced by fish can be enough to resuspend sediments (Oca *et al*, 2005). The turbulence level needed should increase with the consolidation time. In this study we use an oscillating grid to determine the level of turbulence needed to resuspend biosolids immediately after their collection, after different consolidation times (t_c) and after two successive resuspension processes.

The grid was calibrated following the method described by Masaló *et al* (2005), and using the empirical equation described by Hopfinger and Toly (1976), which relates the root mean square of the turbulent velocity (*RMS*) with oscillation frequency (*f*), stroke length (*S*), mesh spacing of the grid (*M*) and distance between the mid-point of the grid and the measurement point (*z*) ($RMS=C\,M^{0.5}\,S^{1.5}\,f\,z^{-1}$). *C* was experimentally determined by Acoustic Doppler velocimetry. We used a grid with 0.2 cm thick bars and 1.2 cm mesh (*M*), three strokes (*S*=1, 1.5 and 3 cm), three distances (*z*=2.4, 2.7 and 3 cm), and frequencies (*f*) from 1 to 6Hz. C took values of 0.265 ($r^2 = 0.86$) and 0.382 ($r^2 = 0.96$), for $C_{x\text{-}y}$ and C_z, respectively.

Sediments were collected in a 0.7 m^3 tank containing sea bass (*Dicentrarchus labrax,* L.).

Two sediment behaviours were determined: saltating motion on the bottom and resuspension motion (Rijn, 1993). These behaviours were studied after one and two successive resuspension processes (R1 and R2), and with consolidation times (t_c) of 0 or 120 h after their collection and 96 h after the second resuspension (Table 1).

Tests indicated that with a t_c of 120 h the *RMS* needed to resuspend biosolids after the first resuspension process (R1) was around 60% higher than the *RMS* needed just after biosolids collection. To resuspend the sample a second time (R2), implies a new increase in the needed *RMS* around 50%.

R	t_c (h)	Saltating		Resuspension	
		$RMS_{x\text{-}y}$	RMS_z	$RMS_{x\text{-}y}$	RMS_z
1	0	0.62	0.89	0.80	1.15
1	120	0.97	1.41	1.33	1.92
2	120+96	1.37	1.97	2.05	2.96